IDENTIFICATION OF RETINAL DISEASE USING BLOOD VESSEL EXTRACTION

AMRUTHA VV

Roll NO : 07

Product Owner:
Mr.BALACHANDRAN KP

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INTRODUCTION

Blood vessel in retina is an important component in finding the cardiovascular disease, ophthalmological disease and segmentation of vessel tree in retina is used for computerbased identification systems. It has been identified that in some cases the symptoms of some diseases such as Diabetic Retinopathy, Hemorrhages cannot be differentiated from that of the blood vessels while training the fundus images. The Image segmentation process is examined to increase the accuracy using debauched vessel segmentation method which will help us to remove the blood vessels from the fundus images and provides easy processing. The precise retinal vessel segmentation has been established and executed. The blood vessel extraction is an edge enhancement and detection algorithm are analyzed.Then here we using algorithm is Convolution neural network(CNN). Through this algorithm we get the result easly.

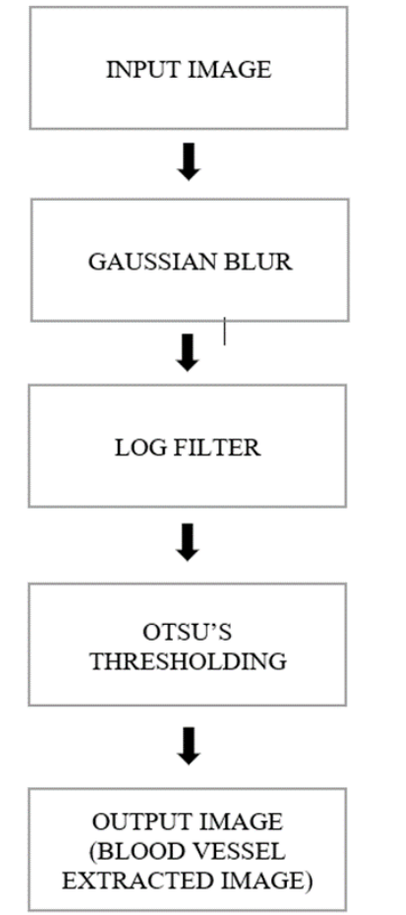
METHODOLOGY

- The Image segmentation process is examined to increase the accuracy using debauched vessel segmentation method which will help us to remove the blood vessels from the fundus images and provides easy processing. The precise retinal vessel segmentation has been established and executed. The blood vessel extraction is an edge enhancement and detection algorithm are analyzed.The Edge Enhancement and Edge detection method(EEED method) separates the surplus edges and does not consider the blood vessels.The method is faster and finds the good results,the significance of the method to these method is to improve the blood vessels contrast and diffuse the anomalous topographies in the retina image.The process involved in the EEED method is,First we input a retinal image. Then the retina image is convert into grayscale form, are often used for extracting descriptors instead operating on color images.and it reduces computational requirements. Then it is convolved with gaussian large bluring kernel to extract the blood vessels. The blurred image contains only the illumination pattern and other patterns get lost. the Gaussian blurred image is obtained from the retinal fundus image .this blurred image is given as an input to the log filter of a certain kernel size.then it will remove the noise and move blood vessel on images more clearly. The significance of log filter gives the uniform background intensity image.

The image consists of higher intensity and maintain uniform intensity and is to be processed for cannial edage detection.It returns a single intensity threshold that seperates pixels into two classes,forground and background.through this we will get a cleared structure of blood vessels.Then here we using algorithm is Convolution neural network(CNN).The blood vessel extracted images will be the trained using CNN.first we trained the system by giving image input from the datset.

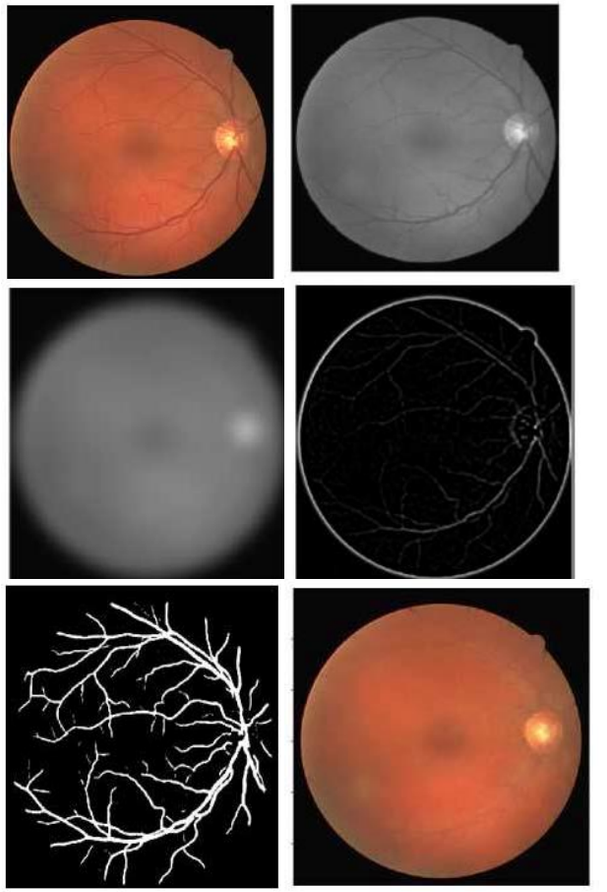
from already labeled images in the data set, we gives images as a input to the system.and it will extract the pixels and generate a pattern,the pattern will be,same disease are one pattern,normal ones are one pattern like.so the CNN model have the knowledge to analyse the patterns.and the user uploads an image , first it will convert in to gray scale then it go to guassian blurred method and cannial detection will preprocess it.and for detecting disease it will go two CNN and compare the images with the patterns and find the matching one and gives the corresponding output.

Flow of the process



Feature extraction

- Input Fundus Image.
- Gray Scale converted Image.
- Gaussian Blurred Image.
- LOG filtered Image.
- OTU’s thresholding done.
- Blood vessel extracted.



Grayscale coversion:-

- Retinal fundus image for vessel tree extraction EEED method, processes the image first we convert it to gray scale. This image is convolved with a Gaussian blurring kernel of the standard deviation σ = 24. represents the blurred image.
- The retina image is convert into grayscale form, are often used for extracting descriptors instead operating on color images.and it reduces computational requirements.Also we can identify the features easly.

Gaussian Blurr:-

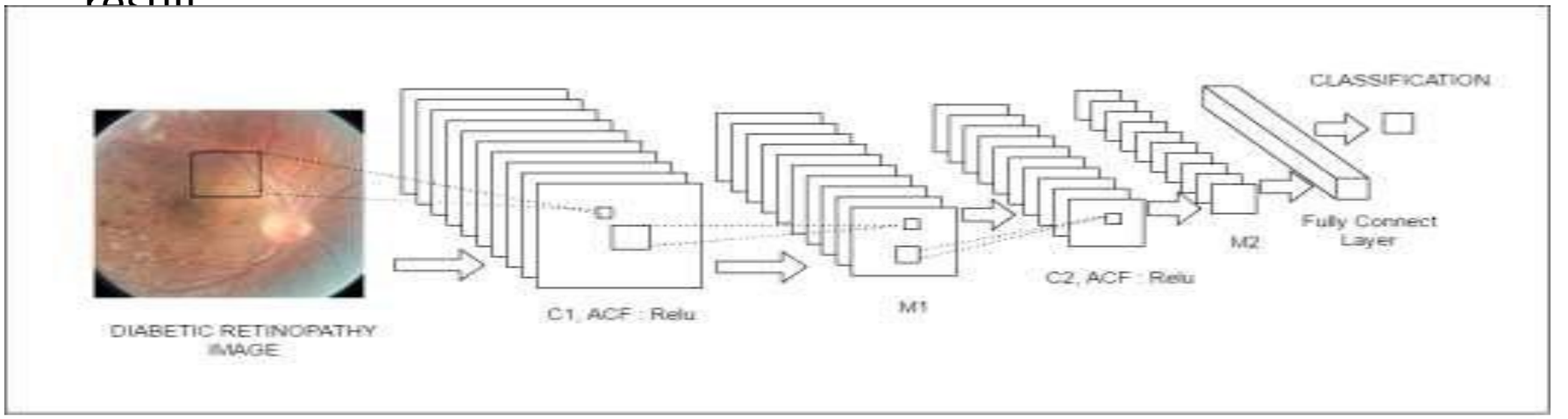
- After retinal image is convert into grayscale .Then it is convolved with gaussian large bluring kernel to extract the blood vessels. The blurred image contains only the illumination pattern and other patterns get lost. the Gaussian blurred image is obtained from the retinal fundus image .this blurred image is given as an input to the log filter of a certain kernel size.
- This image is given as an input of the gaussian kernel of the standard deviation is one. It aids to cultivate steadiness in the tree vessel structure or otherwise wrecked or we can say the corresponding pixels can be lost in the binary vessel tree can be perceived. The threshold fining can be measured and does not provide a vessel tree in a suitable manner. It is due to the fact that the illumination background is not in uniform.

LOG filtering:-

- The illumination background is not in uniform. In order to avoid this problem. Log kernel size of nine x nine matrix has been convolved
- It is then inverted using blood vessels consists of bright concentrations and edges are considered to be brighter. The finest value of threshold is calculated in figure 5 and hence the binary image is obtained. This binary image noise component is not available in vessel tree. If still noise component is present, the length filtering is used to eliminate the binary noise. The window size eight x eight has been selected and the removal of noise has been implemented . And the resultant image is produced.

CNN Algorithm:-

- There are multiple convolutional layers extracting features from the image and finally the output layer.
- CNN extracts the feature of image and convert it into lower dimensions without loosing its characteristics.
- The role of cnn is to reduce the images into a form which is easier to process,without losing features which are critical for getting good prediction.
- Each input layer is connected to the next hidden layer.
- CNN is mainly used in image recognition, object detection and segmentation
- The output obtained is compared with dataset and then predict the result



FUTURE ENHANCEMENT

These Blood vessels extracted images will be then trained using a convolution neural network and then the results will be compared with that of those images with blood vessels. It is expected that the accuracy will be more for the blood vessel extracted.In this project only the final disease prediction can be done, next planning to predict different level prediction to include more algorithm.And in this project we can add hospital management for know the available eye specialists.And also we can provide a chat port for clear peoples doubts with medical department.

MODULES

❖ Expert System

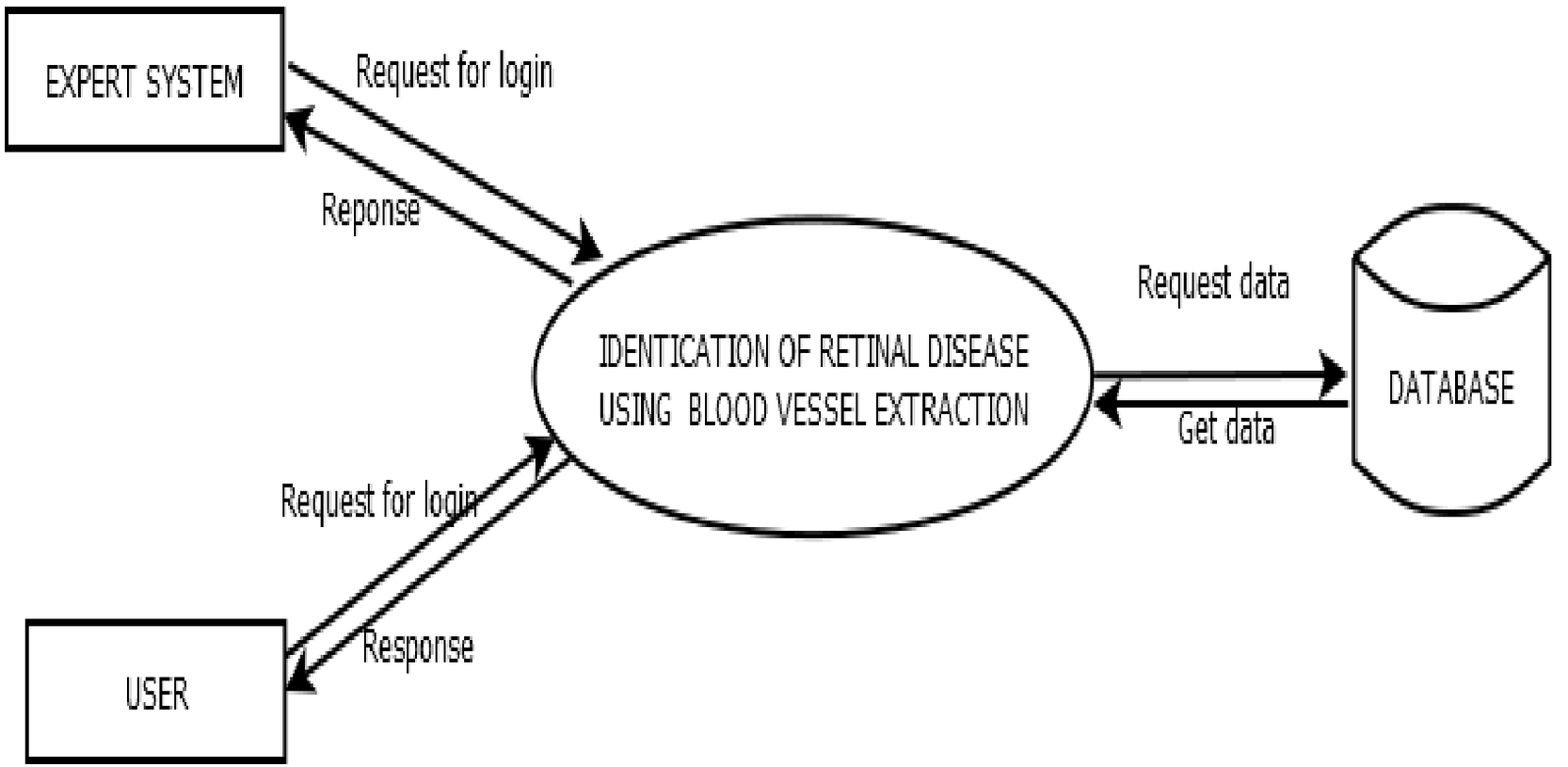
- **Login**
- **Add and manage dataset**
- **View feedback**
- **Add&manage treatments**

❖ User

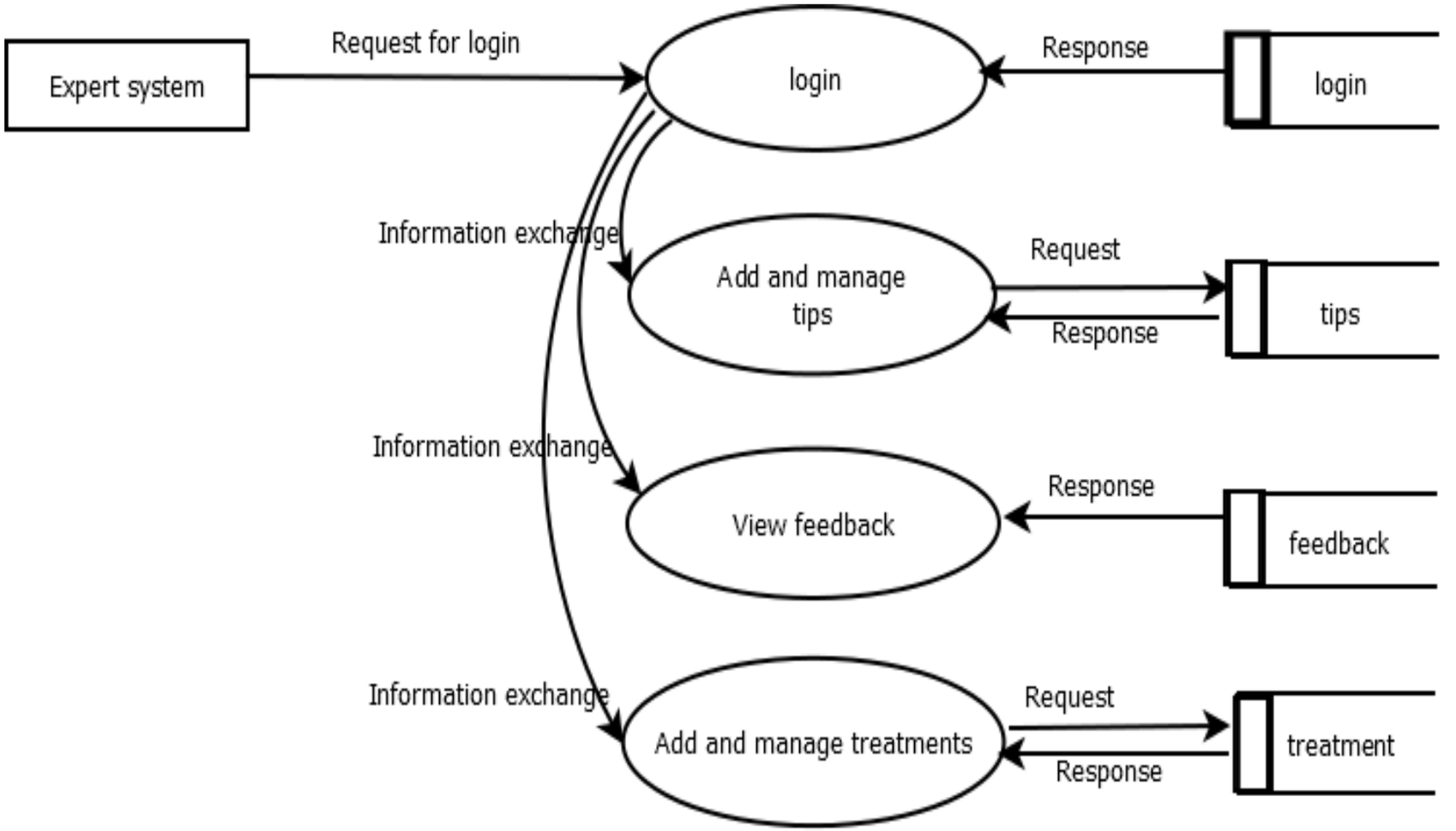
- **Registration**
- **Login**
- **View tips**
- **View treatments**
- **Upload image&view result**
- **Send feedback**
- **Logout**

DATA FLOW DIAGRAM

➢ **Level 0:-**



➢Level 1:-


Expert system
Request for login
login
Response
login
Information exchange
Add and manage tips
Request
Response
tips
Information exchange
View feedback
Response
feedback
Information exchange
Add and manage treatments
Request
Response
treatment

➢Level 2:-

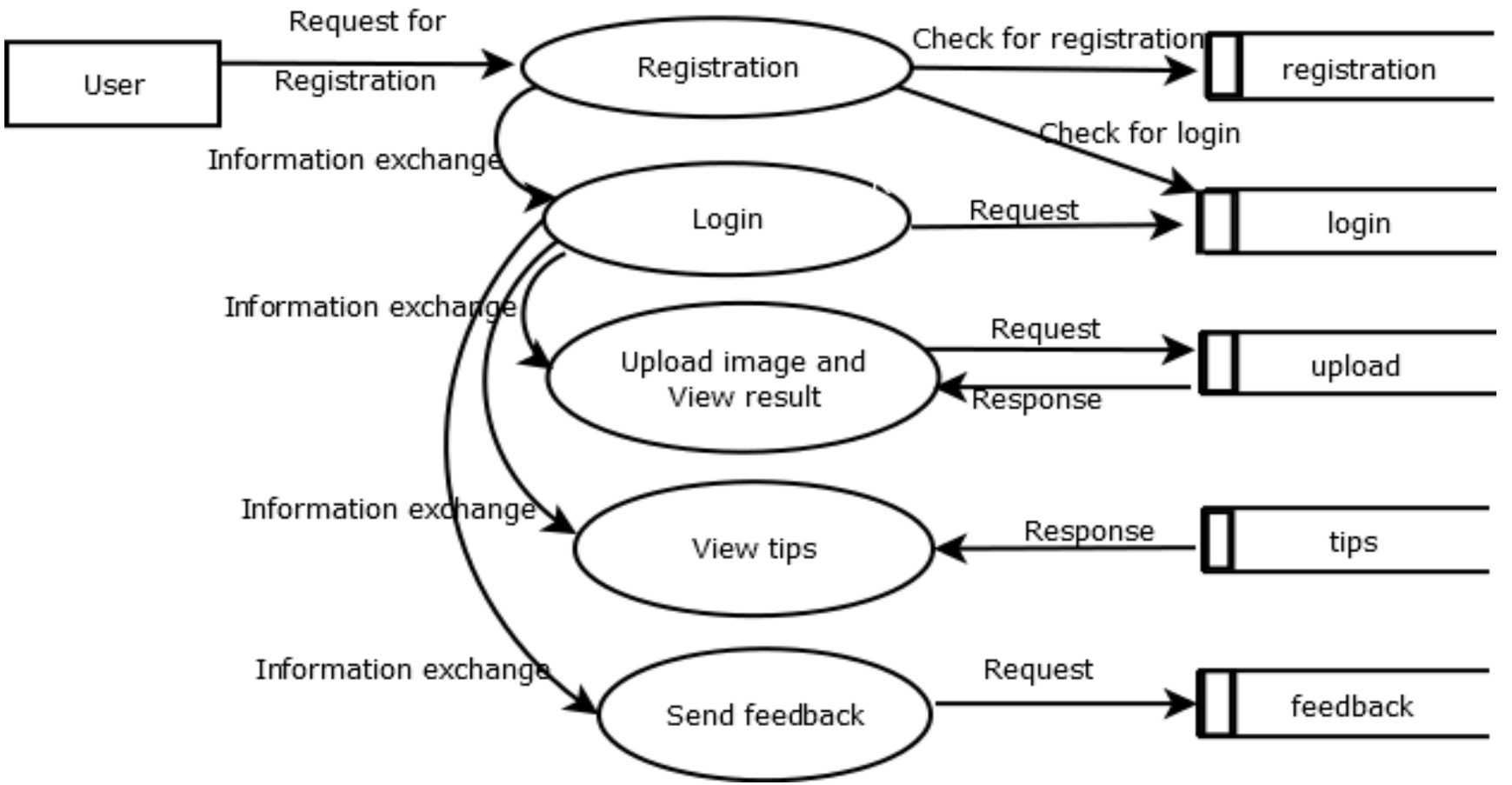
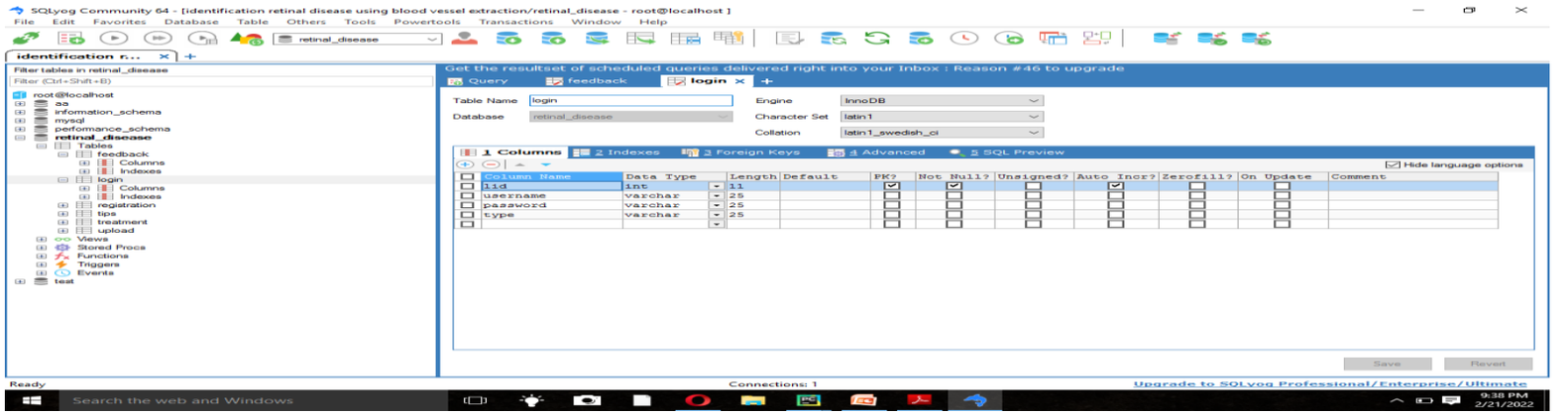
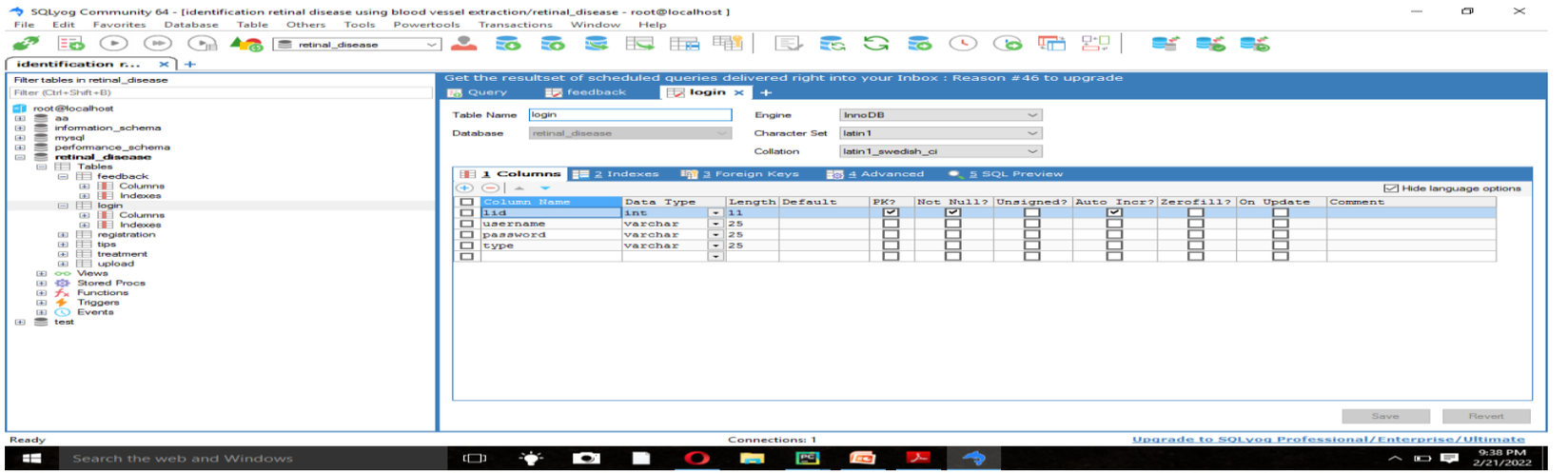

User
Request for
Registration
Registration
Check for registration
registration
Check for login
Information exchange
Login
Request
login
Information exchange
Upload image and
View result
Request
Response
upload
Information exchange
View tips
Response
tips
Information exchange
Send feedback
Request
feedback

TABLE DESIGN

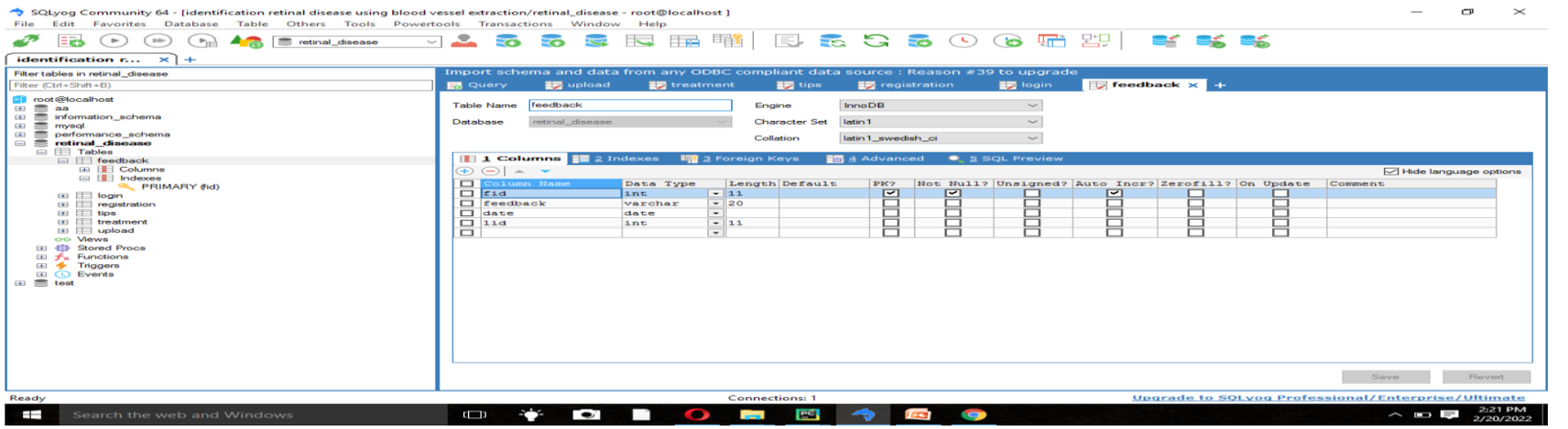
Login:-



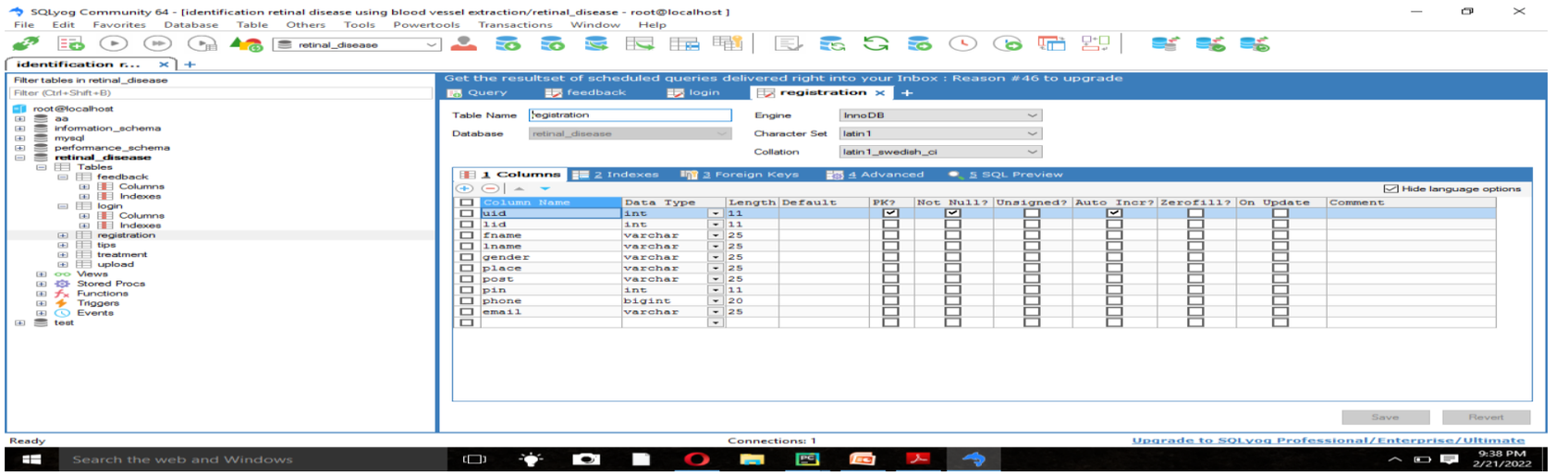
Tips:-



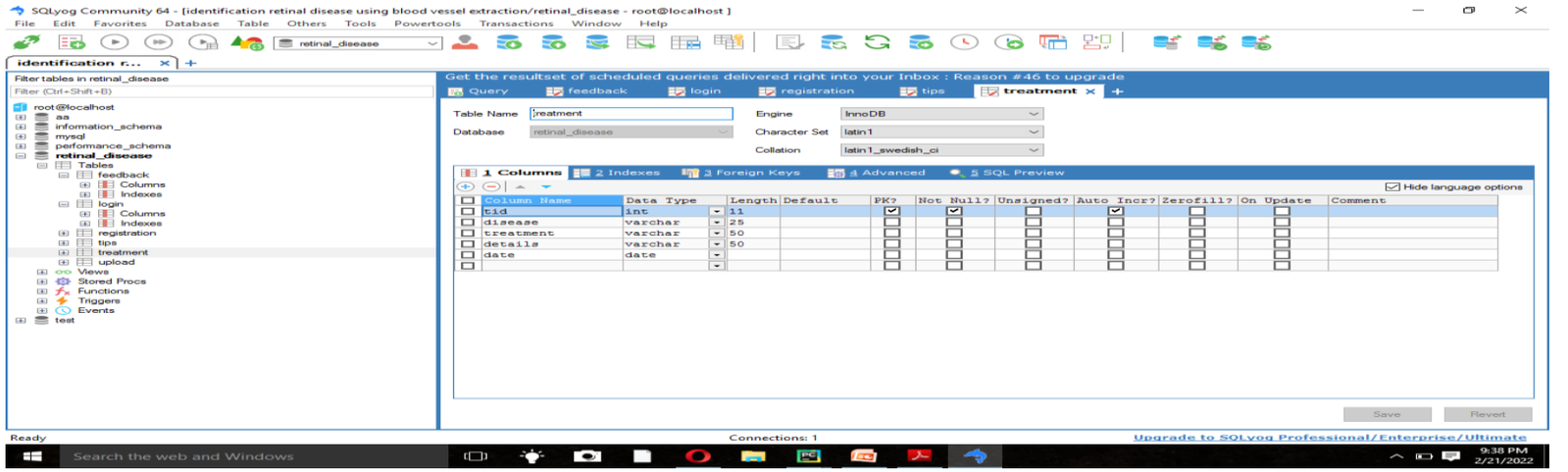
Feedback:-



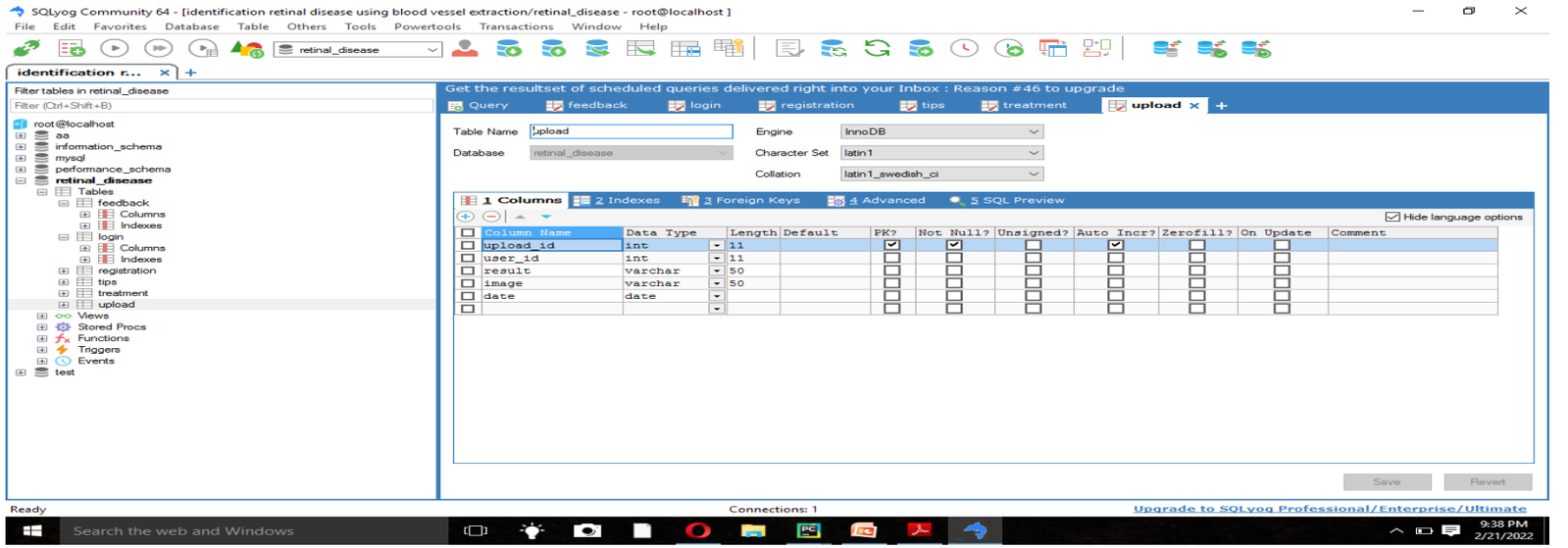
Registration:-



Treatment:-



Upload:-



DEVELOPING ENVIRONMENT

- OPERATING SYSTEM : WINDOWS 10
- FRONT END : HTML, CSS, JAVASCRIPT
- BACK END : MySQL
- Dataset: Retinal disease Dataset from Kaggle website is used
- IDE : JetBrains PyCharm, Android studio
- TECHNOLOGY USED : PYTHON,JAVA
- FRAME WORK USED : Flask

USER STORIES

UserStoryID	As a <type of user>	I want to <perform some task>	So that I can <Achieve some goal>
1	Expert	login	login successful with correct username and password
2	Expert	Add and manage dataset	Add disease effected fundus image.
3	Expert	Add and manage tips	Add tips for users and view the added tips.
4	Expert	View feedback	View user feedback
5	Expert	Add and Manage treatments	Add treatments for different eye disease.
6	User	Register	User can register with this app
7	User	Login	login successful with correct username and password
8	User	Upload image and view result	Upload image and View result
9	User	View tips	View added tips
10	User	Send feeback	Send feedback
11	User	View treatments	View added treatments

PRODUCT BACKLOG

User Story ID	Priority <High/Medium/Low>	Size (Hours)	Sprint <#>	Status <Planned/In progress/Completed>	Release Date	Release Goal
1	Medium	2	1	Completed	08/01/2022	Table design
2	High	3		Completed	08/01/2022	Form design
3	High	5		Completed	08/01/2022	Basic coding
4	High	5	2	Completed	13/01/2022	Obtaining Gaussian blurred image from retinal image
5	Medium	5		Completed	18/01/2022	Preprocessing
6	High	5	3	Completed	23/01/2022	Image classification
7	Medium	5		Completed	07/02/2022	Prediction
8	Medium	5	4	Completed	12/01/2022	Testing data
9	High	5		Completed	20/02/2022	Output generation

PROJECT PLAN

User Story ID	Task Name	Start Date	End Date	Days	Status
1	Sprint 1	26/12/2021	28/12/2021	2	Completed
2		29/12/2021	31/12/2021	3	Completed
3		03/12/2021	08/01/2022	5	Completed
4	Sprint 2	09/01/2022	13/01/2022	5	Completed
5		14/01/2022	18/01/2022	5	Completed
6	Sprint 3	19/01/2022	23/01/2022	5	Completed
7		03/01/2022	07/02/2022	5	Completed
8	Sprint 4	08/02/2022	12/01/2022	5	Completed
9		16/02/2022	20/02/2022	5	Completed

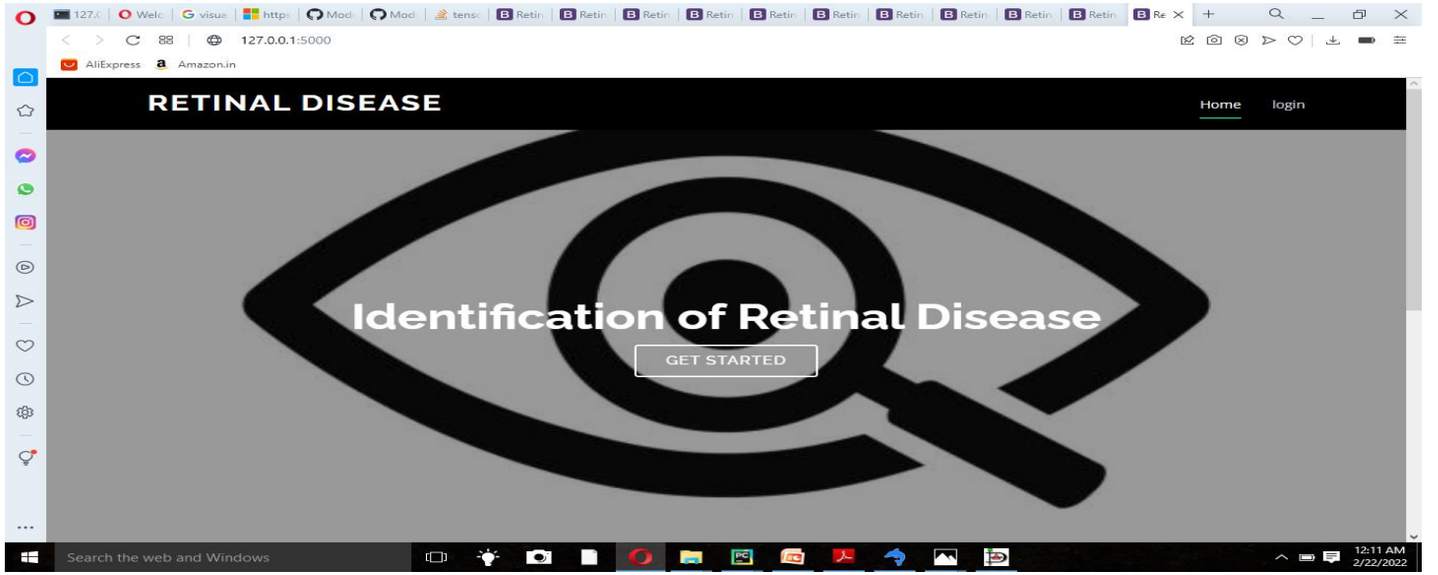
SPRINT BACKLOG PLAN

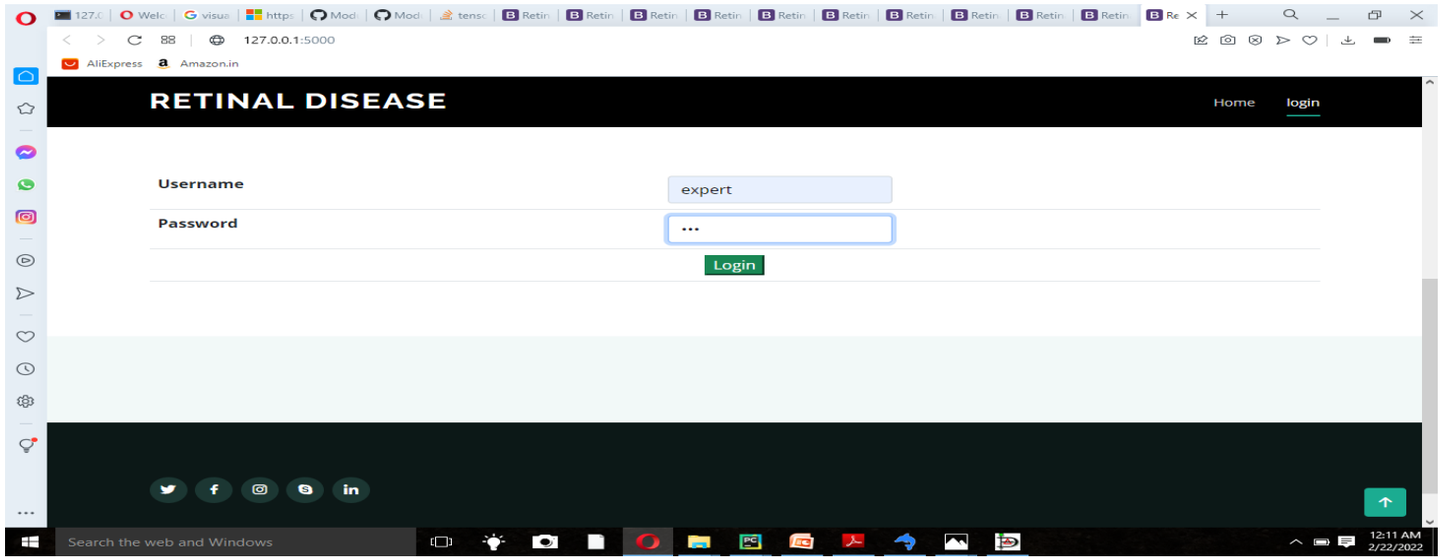
Backlog Item `	Status & completion date	Original estimate in hours	Day1	Day2	Day3	Day4	Day 5	Day6	Day7	Day8	Day9	Day10	Day11	Day12	Day13	Day14
User story #1,#2,#3,		hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs
Table design	28/12/2021	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Form design	31/12/2021	3	0	0	0	1	1	1	0	0	0	0	0	0	0	0
Basic coding	08/01/2022	5	0	0	0	0	0	0	0	0	0	1	1	1	1	1
User story #4,#5																
Obtaining Gaussian blurred image from retinal image	13/01/2022	5	1	1	1	0	0	1	1	0	0	0	0	0	0	0
Preprocessing	18/01/2022	5	0	0	0	0	0	0	0	0	0	1	1	1	1	1
User story #6,#7																
Image classification	23/01/2022	5	5	1	1	1	1	0	0	0	0	0	0	0	0	0
prediction	07/02/2022	5	0	0	0	0	0	2	1	2	0	0	0	0	0	0
User story #8,#9																
Testing data	12/02/2022	5	0	0	0	0	0	0	0	1	1	2	1	0	0	0
Output generation	20/02/2022	5	0	0	0	0	0	0	0	0	0	0	0	2	2	1
Total		40	3	3	2	2	2	4	2	3	1	4	3	4	4	3

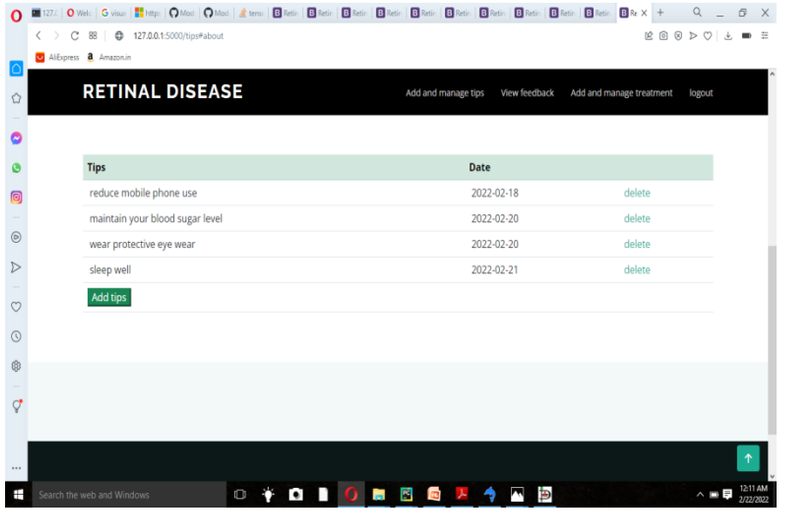
SPRINT ACTUAL

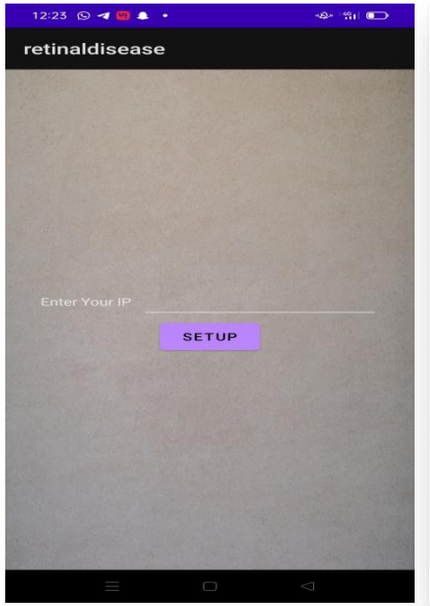
Backlog Item	Status & completion date	Original estimate in hours	Day1	Day2	Day3	Day4	Day5	Day6	Day7	Day 8	Day9	Day10	Day11	Day12	Day13	Day14
User story #1,#2,#3,		hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs
Table design	28/12/2021	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Form design	31/12/2021	3	0	0	0	1	1	1	0	0	0	0	0	0	0	0
Basic coding	08/01/2022	5	0	0	0	0	0	0	0	0	0	1	1	1	1	1
User story #4,#5																
Obtaining Gaussian blurred image from retinal image	13/01/2022	5	1	1	1	0	0	1	1	0	0	0	0	0	0	0
Preprocessing	18/01/2022	5	0	0	0	0	0	0	0	0	0	1	1	1	1	1
User story #6,#7																
Image classification	23/01/2022	5	0	0	0	2	0	1	0	1	0	0	0	0	1	0
prediction	07/02/2022	5	0	0	0	0	0	2	1	2	0	0	0	0	0	0
User story #8,#9																
Testing data	12/02/2022	5	0	0	0	0	0	0	0	1	1	2	1	0	0	0
Output generation	20/02/2022	5	0	0	0	0	0	0	0	0	0	0	0	2	2	1
Total		40	2	2	1	3	1	5	2	4	1	4	3	4	5	3

Screen shots






RETINAL DISEASE
Add and manage tips
View feedback
Add and manage treatment
logout
Tips
Date
reduce mobile phone use
2022-02-18
delete
maintain your blood sugar level
2022-02-20
delete
wear protective eye wear
2022-02-20
delete
sleep well
2022-02-21
delete
Add tips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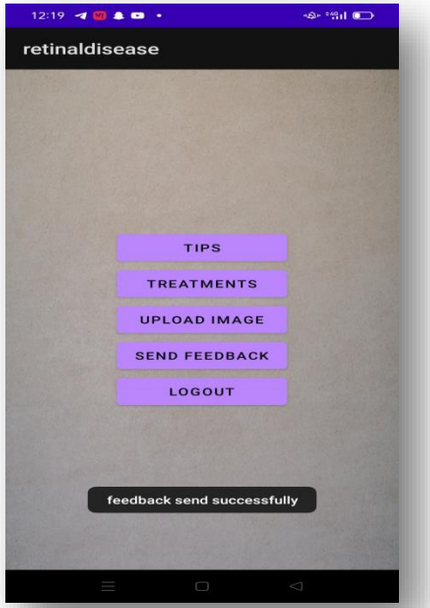
Enter Your IP
SETUP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TIPS
TREATMENTS
UPLOAD IMAGE
SEND FEEDBACK
LOGOUT
feedback send successfully

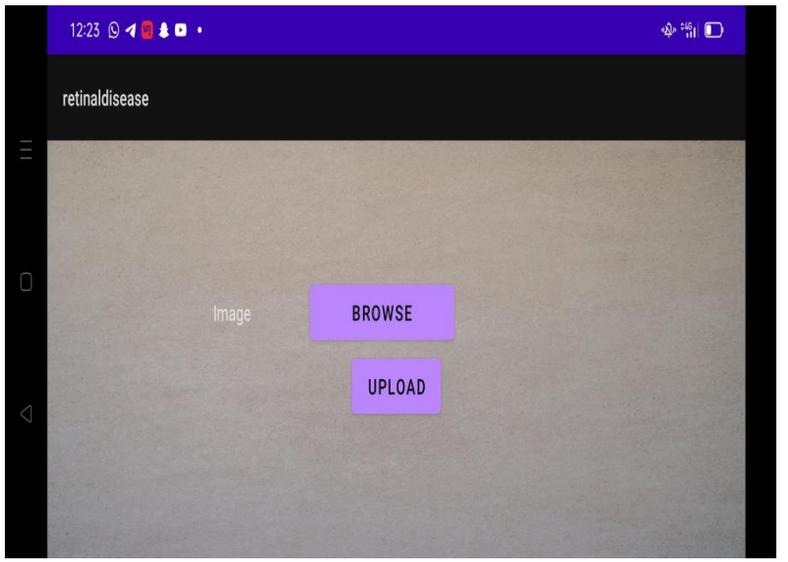
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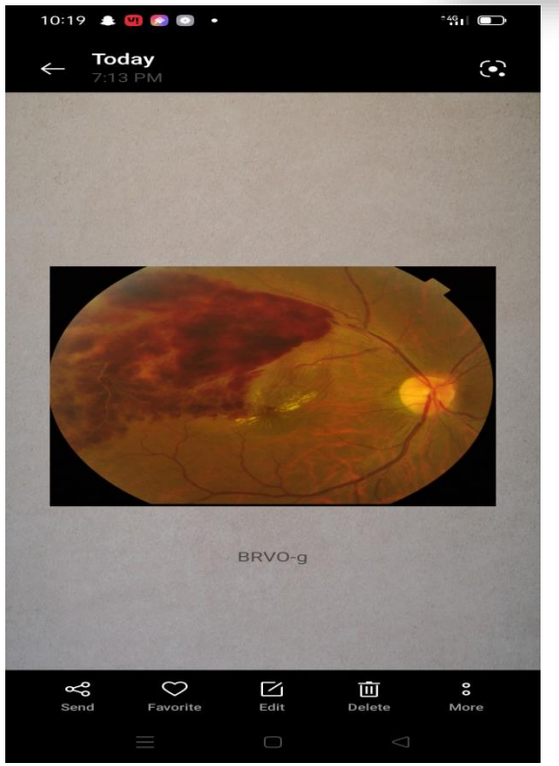
Image
BROWSE
UPLOAD


Today
7:13 PM
BRVO-g
Send
Favorite
Edit
Delete
More

THANK YOU